point where the diameter changes and might easily escape notice, and is scarcely visible in some of the present specimens. A female and male have been selected and given Cat. No. 69867 U.S.N.M.

Female.—Krøyer's statement that this species is marked by an elongation of the carapace, genital segment, and abdomen applies to both sexes. Carapace of female three-sevenths of the entire length and considerably narrowed anteriorly; lunules of medium size and not projecting. Median posterior lobe half the entire width of the carapace, its margin not evenly rounded but with the tip projecting a little. Lateral lobes curved inward and not quite reaching the tip of the median lobe. Free segment two-thirds as wide as the genital segment and strongly narrowed in front of the fourth legs. Genital segment elongate elliptical, three-fourths as long as the carapace, narrowed anteriorly into a short neck and lobed posteriorly. Each of the lobes is as wide as the abdomen, broadly rounded, and does not quite reach the joint in the abdomen. The latter is one-third as wide and nearly as long as the genital segment, and indistinctly two-segmented, the distal segment the longer. Caudal rami nearly as wide as long and well separated. Ovisacs attached to the ventral surface of the genital segment just inside the base of each posterior lobe and as long as the genital segment.

Second antenna large and sickle-shaped; terminal segment of second maxilla slender, longer than the basal segment, with two terminal setae but no lateral spine. Maxilliped with a swollen basal segment and a stout terminal claw. Basipod of first leg with a minute process representing the endopod; terminal segment of the exopod with 3 end spines and a long naked seta, but with no plumose setae on its posterior margin. The armature of the second legs is very peculiar; the basal segment of the exopod carries a long filose spine at the center of the outer margin and a stout spine at the distal corner, bent down across the ventral surface, with a fringe of long hairs between the two spines. The distal segment has 3 setae at its outer corner, flanged on their outer margins and plumed on their inner margins. The basal segment of the endopod has a fringe of small curved spines on the distal half of its outer margin. The second segment has a row of 6 stout spines along its outer margin; the bases of these spines are swollen, cover the whole length of the margin, and are somewhat imbricated. In the third legs the spine on the basal segment of the exopod is nearly straight and reaches the entire length of the second segment. The fourth legs are three-segmented with 5 spines, the second segment as long as the third and the two combined as long as the basal segment, which is moderately swollen. There are no rudiments of fifth legs anywhere visible. Small spherical spermatophores are attached in pairs at the opening of the sperm receptacle.

Total length 4.40 mm. Carapace 2 mm long, 1.90 mm wide. Ovisacs 2 mm long.

Male.—Carapace similar in shape to that of the female, but relatively longer, being just half of the entire length; lunules larger and suborbicular, but scarcely projecting. Posterior median lobe a little more than half the entire width and evenly rounded, extending a little beyond the lateral lobes. Free segment wider than the genital segment, greatly narrowed in front of the fourth legs. Genital segment barrel-shaped, not narrowed to a neck anteriorly and without posterior lobes. Abdomen distinctly two-segmented, the distal segment nearly twice the length of the basal, both segments of the same width throughout with straight sides. Caudal rami nearly twice as long as wide and curved inward. Appendages like those of the female with the following differences.

Maxillary hooks considerably enlarged and strongly curved; maxillipeds with a row of 3 short triangular spines on the inner margin of the basal segment, the terminal claw shutting down against the two distal spines. The claw itself has a slender spine at the center of its concave margin, which is close to the distal spine of the basal segment when the claw is closed. The terminal segment of the first legs carries the usual 3 plumose setae on its posterior margin. In the second legs the fringe of spines on the outer margin of the second segment of the endopod is here replaced by a row of 8 to 10 chitin scales closely imbricated.

Total length 4.50 mm. Carapace 2.25 mm long, 1.90 mm wide.

Remarks.—The armature of the second endopod segment of the second legs in both sexes is not known in any other species of the genus and evidently escaped Krøyer's notice. It lends a distinctive character to the species and with the other details fully establishes its validity after 75 years of waiting.

Caligus patulus, n. sp.

Twelve females were obtained from the outer skin of a milkfish (*Chanos* sp.) captured in the Bay. One of them bearing ovisacs has been chosen as the type of the species with Cat. No. 69869 U.S.N.M.

Female.—Carapace five-eighths of the entire length, almost as wide as long; frontal plates wide and separated by a deep median incision; lunules of moderate size and not projecting. Posterior median lobe half the entire width, with prominent posterior corners; lateral lobes broadly rounded and the same length as the median lobe. Free segment two-fifths as wide as the carapace and thickened through the bases of the fourth legs. Genital segment two-thirds as wide as the carapace and almost twice as wide as long, contracted to the width of the free segment where it joins the latter, Its posterior lobes are broadly rounded and carry rudiments of the fifth and sixth pairs of legs and wide processes at their inner corners, giving them a sinuous outline. The abdomen is quadrangular and one-segmented, as wide as long; the caudal rami are also as wide as long and well separated at the posterior corners of the abdomen. The ovisacs are a little narrower than the abdomen and two-thirds as long as the entire body.

The antennae and maxillae are of the usual pattern; the claw of the maxilliped is as long as the basal segment and abruptly bent near the tip. The basal segment of the first leg has at its posterior distal corner a finger process tipped with a short spine representing the endopod. The proximal segment of the exopod has a fringe of hairs on its posterior margin, and a spiny process at its anterior distal corner; the end segment has two terminal claws and three stout plumose setae. In the third legs the spine on the basal segment of the exopod is short and blunt, and the two rami are close together. The fourth legs are three-segmented with four spines; the second segment is longer than the third and the two combined are the same length as the basal segment. The fifth and sixth legs are represented by small processes tipped with minute setae. The base of the furca is longer than wide, the arms are shorter than the base, nearly parallel and flattened.

Total length 6 mm. Carapace 3.60 mm long, 3.59 mm wide.

Remarks.—The distinguishing characters of this species are the large and roomy genital segment (whence the specific name) with its sinuous posterior

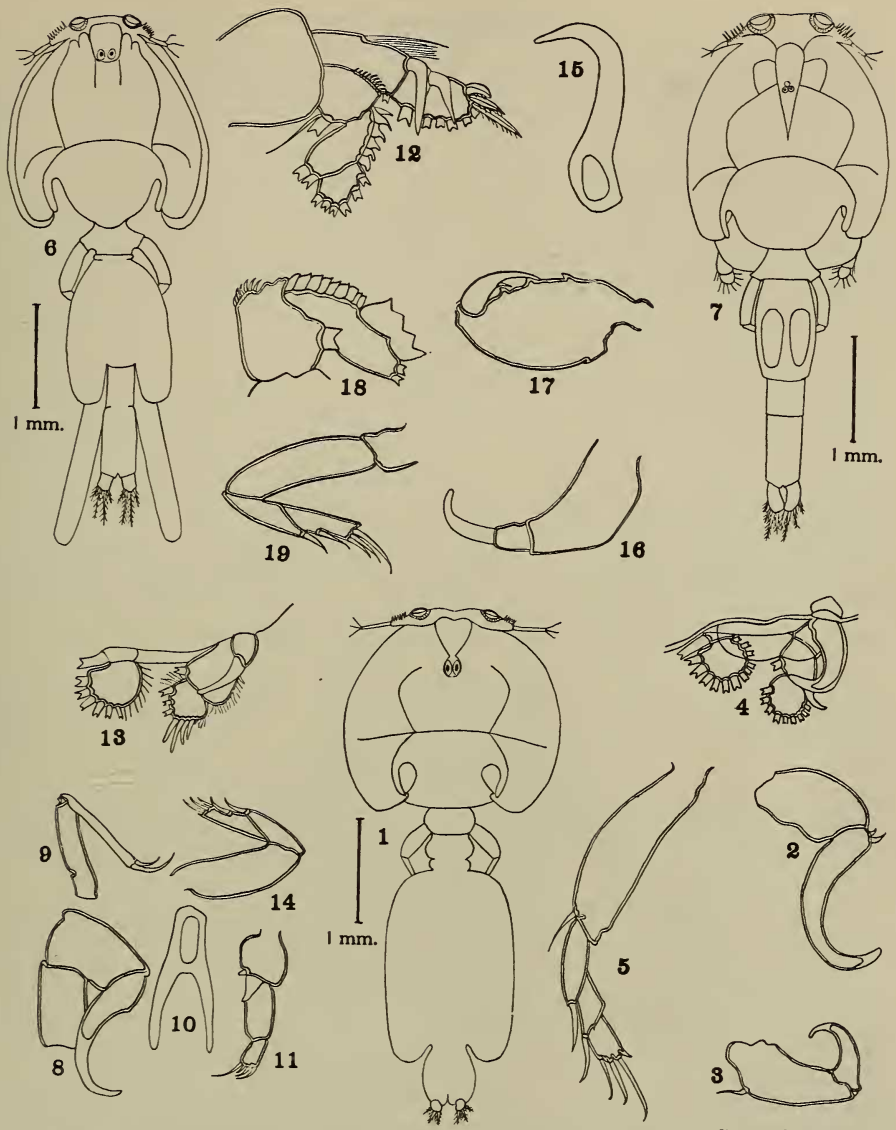

Fig. 1.—Dorsal view of female *Caligus constrictus*. Fig. 2.—Second antenna. Fig. 3.—Maxilliped. Fig. 4.—Third leg. Fig. 5.—Fourth leg. Fig. 6.—Dorsal view of female *Caligus monacanthi*. Fig. 7.—Dorsal view of male. Fig. 8.—Second antenna of female. Fig. 9.—Second maxilla. Fig. 10.—Furca. Fig. 11.—First leg. Fig. 12.—Second leg. Fig. 13.—Third leg. Fig. 14.—Fourth leg. Fig. 15.—Maxillary hook of male. Fig. 16.—Second antenna. Fig. 17.—Maxilliped. Fig. 18.—Second leg. Fig. 19.—Fourth leg.

lobes, and the long fourth legs, which reach beyond the posterior margin of the genital segment. The relative lengths of the second and third segments in these fourth legs are also useful for identification since it is usual for the third segment to be the longer.

Caligus constrictus Heller

Nine females were obtained from the gills of the crevalle, *Caranx hippos*, and three females from the gills of the dolphin, *Coryphaena hippurus*. This species, established by Heller 72 years ago upon a single male and not reported since then, was confirmed in the paper on the parasitic copepods of the Third Hancock Expedition, to which reference has already been made. It is pleasing to obtain so promptly these additional specimens from the same host and locality, and also the others from a new host. It is evident that the crevalle is to be regarded as the chief host and that the parasite is by no means as rare as the long intervals between its appearances would seem to suggest. These new specimens vary somewhat from those already described and the differences are as follows.

In the carapace the eye is visible, while it could not be located in previous specimens. The posterior corners of the median lobe project laterally and overlap the tips of the incurved lateral lobes. The genital segment has no attached spermatophores, the abdomen is as wide as long and the caudal rami are relatively larger. The base of the terminal claw of the second antenna is armed with two minute spines on its inner margin. The basal segment of the maxilliped has a small seta on its posterior margin near the proximal end. The basal segment of the fourth leg has a spine at its distal end similar to those on the other three segments.

These slight differences simply emphasize the validity of the species and show that it does exhibit certain variations.

Caligus tenuifurcatus, n. sp.

Nine specimens, including both sexes, were obtained from the gill cavity of the papagallo, *Nematisteus pectoralis* Gill. A male and female have been selected for types with Cat. No. 69874 U.S.N.M.

Female.—Carapace ovate, narrowed anteriorly, a trifle longer than wide and 40 per cent of the entire length; frontal plates wide and without a central incision; lunules large, circular and projecting considerably. Median posterior lobe more than half the entire width and evenly rounded; lateral lobes curved inward but not meeting the median lobe. Free segment short and one-fourth as wide as the carapace; genital segment a little longer than wide, subquadrangular, with rounded anterior and pointed posterior corners, and slightly convex sides. There are no posterior lobes and no visible leg rudiments. Abdomen nearly as long as the genital segment, tapering a little posteriorly and two-segmented, the distal segment longer than the proximal. Caudal rami twice as long as wide, close together and curved inward. Ovisacs as long as the urosome and somewhat divergent.

First antennae short and turned backward; second antenna stout, its terminal claw bent into a half circle. Basal segment of maxilliped also stout, the terminal claw half as long as the segment with two unequal small spines near the center of its concave margin. Rudimentary endopod of the first legs a very small triangular spine; end segment of exopod with three terminal claws and a much longer spine, and three plumose setae. Fourth leg three-segmented with six spines, including the very small one at the tip of the basal segment. Second and third segments of equal length and together as long as the basal segment.

Total length 5 mm. Carapace 2.10 mm long, 2 mm wide.

Male.—Carapace proportionally larger, a little more than half the entire length and longer than wide; frontal plates with even larger lunules than in the female. Free segment wider than the genital segment and strongly contracted anteriorly. Genital segment a parallelogram, one-half longer than wide, with straight sides. Abdomen a trifle longer than the genital segment and two-segmented, the distal segment one-third longer than the proximal. Caudal rami twice as long as wide and curved inward at their tips.

The antennae, mouth parts, and legs are like those of the female with minor differences. The furca, like that of the female, is more than four times as long as wide, with slender and slightly divergent arms about as long as the base.

Total length 5.40 mm. Carapace 2.81 mm long, 2.50 mm wide.

Remarks.—The relative size and shape of the genital segment and abdomen in both sexes are characteristic of this new species and will serve well for identification.

Gloiopotes costatus Wilson

Thirty specimens, including both sexes, were taken from the outside surface of a sailfish, *Istiophorus greyi*. Some of these were larger than the dimensions originally given for the species, but not otherwise different.

Lernaeenicus longiventris Wilson

Two mature females and a development stage were taken from the body wall of the common jack, *Caranx hippos*. As this is the first development stage of the female after attachment to the host to be reported for the entire genus, two figures and a brief description are here given.

Young female.—Head elliptical, narrowed anteriorly, slightly projecting on either side at the center, swollen and evenly rounded posteriorly and extended backward a little over the anterior thorax. The latter joins the head not at its posterior end but on the ventral surface a little in front of it, and without definite segmentation. Nearly as wide as the head where it joins the latter, and somewhat flattened dorsoventrally, it quickly tapers backward into a narrow cylinder and passes insensibly into the abdomen. This abdomen is cylindrical and exceptionally elongated to more than forty times the length of the head. It maintains the same diameter throughout its entire length without any traces of segmentation, and the posterior end is smoothly rounded with no caudal rami.

The first antennae are turned back along the surface of the head and are almost invisible. The second antennae have two short and stout basal joints and a strong terminal claw. They are situated just beneath the frontal margin of the head, and behind them on the midline of the ventral surface projects the short mouth tube, on either side of which is a maxilla with very long setae. Farther back the second maxillae project from the ventral surface of the head, each tipped with a bifid claw. The anterior thorax carries four pairs of legs which diminish in size backward; the first two pairs are biramose, the last two pairs uniramose, all the rami two-segmented.

Total length 25 mm. Head 0.50 mm long, 0.25 mm wide.

Remarks.—Evidently the first thing that happens to the young female after attachment to the host is the excessive elongation of the body behind the head. In this there is no differentiation of body regions; thorax, genital

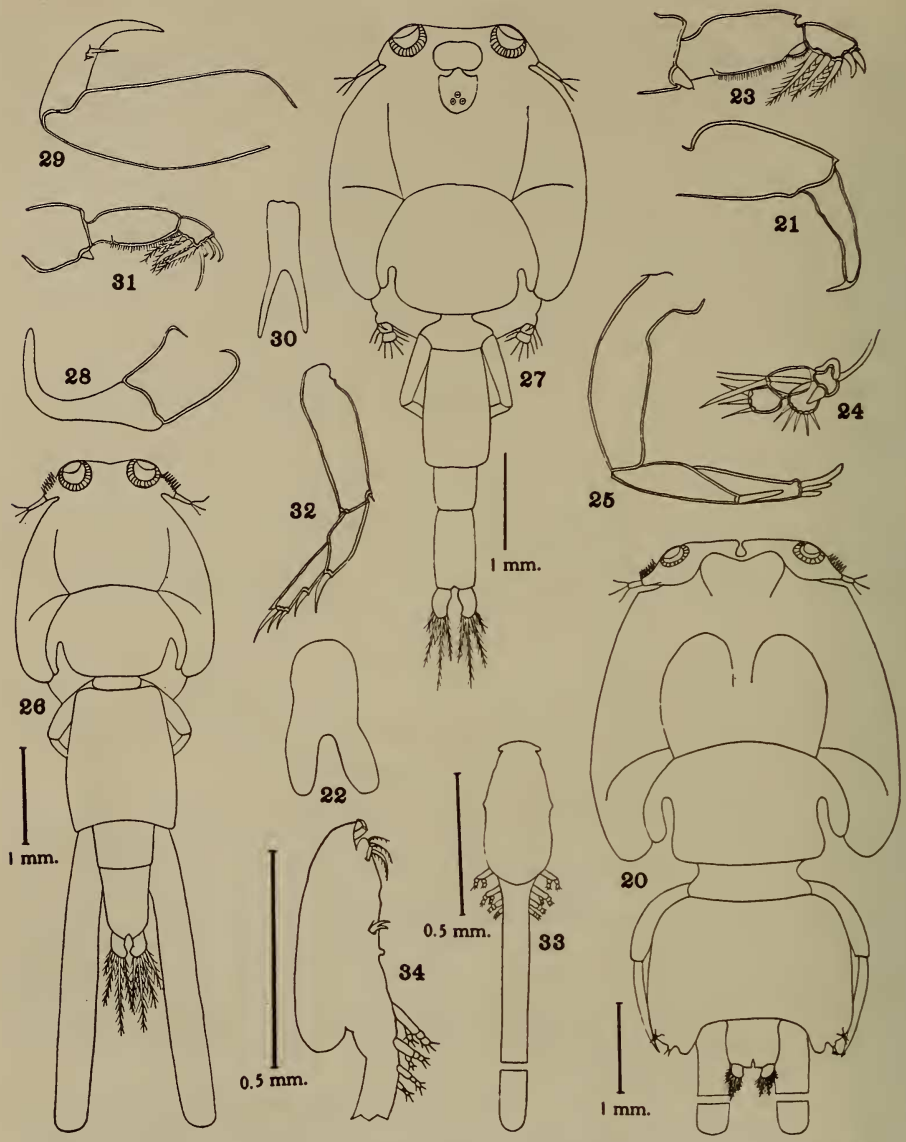

Fig. 20.—Dorsal view of female, *Caligus patulus*. Fig. 21.—Maxilliped. Fig. 22.—Furca. Fig. 23.—First leg. Fig. 24.—Third leg. Fig. 25.—Fourth leg. Fig. 26.—Dorsal view of female *Caligus tenuifurcatus*. Fig. 27.—Dorsal view of male. Fig. 28.—Second antenna of female. Fig. 29.—Maxilliped. Fig. 30.—Furca. Fig. 31.—First leg. Fig. 32.—Fourth leg. Fig. 33.—Dorsal view of a female *Lernaeenicus longiventris* just after attachment to the host. Fig. 34.—Side view of same more highly magnified.

segment, and abdomen are all the same diameter and just alike. Later, with the development of the ovaries, oviducts, and cement glands, the center of the long cylinder is swollen into the genital segment, while the anterior and posterior portions remain unchanged.

Pennella species

Two adult females were taken from the body wall of the same sailfish *Istiophorus greyi*, that yielded the Gloiopotes specimens. These were a large species, 150 mm in length or more, but as the heads were lacking in both specimens, the species could not be determined with certainty.

ORNITHOLOGY.—*Bird bones from archeological sites in Alaska.*[1]

HERBERT FRIEDMANN, U. S. National Museum.

The following collections of bird bones were gathered by Dr. A. Hrdlicka during archeological excavations in the summers of 1935 and 1936. Inasmuch as Kodiak Island was the only area worked in 1935 (also worked to a lesser extent in 1936), we may dispose of it first, and then go on to the Aleutian areas explored in 1936.

1. BIRD BONES FROM KODIAK ISLAND

During 1935, the whole season was spent on Kodiak Island, and a very large collection of bird bones was made. The bones were marked according to the depths from which they came, and therefore, by inference, dated chronologically. Dr. Hrdlicka tells me that the oldest may be 1,500–2,000 years old; the most recent are just pre-Russian, or about 150 years old. Previous collections of bird bones made in 1932 and 1934 have been reported on elsewhere[2] and a complete account of the avifauna of the island has also been published.[3]

The present collection adds but two new birds to the Kodiak list—the golden eagle and the red-legged kittiwake—a clear indication that the bird life of that area is now fairly well-known. The absence of bones of the white-winged scoter and the pigeon guillemot in the present collection is the chief point of contrast with the earlier series of bones collected on Kodiak.

The bones that were perfect enough to be useful as specimens, or that were of particular interest as records, have been saved and incorporated into the skeletal collections of the U. S. National Museum.

Gavia immer (Brunnich). Common Loon. In the 1935 excavations, bones of this bird were unearthed at all levels (superficial, intermediate, and deep)—2 humeri, 2 tibiotarsi, 3 tarsometatarsi, and 2 metacarpals. In 1936 a tarsometatarsus and a metacarpal were collected. It is not possible to identify these bones subspecifically, but the small form *elasson* Bishop is the one known (from skins) to occur on Kodiak Island.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received August 30, 1937.

[2] This JOURNAL 25: 44–51. 1935.

[3] Chicago Acad. Sci. Bull. 5: 13–54. 1935.

Gavia adamsi (Gray). Yellow-billed Loon. All but the deepest layers exposed in 1935 revealed bones of this loon—1 humerus, 3 coracoids, 3 metacarpals, 1 femur, 2 tarsometatarsi, 1 pair of mandibles, and 2 tibiotarsi. A skull was unearthed in the course of the 1936 operations.

Gavia arctica pacifica (Lawrence). Pacific Loon. The presence of osseous remains in all depths excavated indicates the regularity of occurrence of the Pacific Loon in Kodiak Island. In 1935 2 tibiotarsi, 3 tarsometatarsi, and 5 metacarpals were collected; in 1936, 1 skull, 1 femur, and 1 tarsometatarsus.

Gavia stellata (Pontoppidan). Red-throated Loon. A single tibiotarsus was collected in 1936; no bones referable to this species were gathered in 1935.

Colymbus grisegena holboelli (Reinhardt). Holboell's Grebe. Ten humeri and 9 tarsometatarsi, representing all age levels, were taken in 1935; 1 humerus was found in the 1936 collections.

Colymbus auritus Linnaeus. Horned Grebe. Two humeri, one from the deepest and one from the superficial layer, were unearthed in 1935.

Diomedea albatrus Pallas. Short-tailed Albatross. Numerous osseous parts were found at all levels in 1935—2 tibiotarsi, 1 synsacrum, 3 skulls, 1 humerus, 1 coracoid, 3 metacarpals, 8 tarsometatarsi; in 1936—1 skull, 1 synsacrum, 3 metacarpals, 2 tarsometatarsi, 1 femur, and 1 ulna.

Puffinus sp. Shearwater. The following bones, obviously those of shearwaters and probably referable to *Puffinus tenuirostris*, cannot be identified with certainty, due to lack of named comparative material. In 1935 all levels revealed a total of 14 humeri and 3 tarsometatarsi; in 1936, 2 skulls and 6 humeri were obtained.

Fulmarus glacialis rodgersi Cassin. Pacific Fulmar. A lone skull of this bird was collected in 1936.

Phalacrocorax pelagicus Pallas. Pelagic Cormorant. An abundantly represented species with all levels yielding quantities of bones. In 1935, over 200 tibiotarsi, more than 100 femurs, 66 tarsometatarsi, 165 humeri, and 28 synsacra were collected; in 1936, the material involved 1 skull, 25 humeri, 9 tibiotarsi, 2 synsacra, 1 ulna, 1 coracoid, 3 tarsometatarsi, and 5 femurs.

Cygnus columbianus (Ord). Whistling Swan. The 1935 diggings unearthed 4 fragmentary humeri and 1 synsacrum, all from the more superficial layers.

Cygnus buccinator Richardson. Trumpeter Swan. A synsacrum and 2 tarsometatarsi were found in the superficial levels and another tarsometatarsus in the intermediate depths in 1935; in 1936 a metacarpal and the head of a humerus were collected.

Philacte canagica (Sevastianoff). Emperor Goose. All age levels yielded a small number of bones of this goose in the 1935 diggings—1 tarsometatarsus, 1 femur, and 5 tibiotarsi; the 1936 operations netted 3 skulls and 3 tibiotarsi.